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PERFORMANCE ORIENTED PACKAGING TESTING
OF
MK 635 MOD 0 SHIPPING AND STORAGE CONTAINER
FOR
PACKING GROUP II
SOLID HAZARDOUS MATERIALS

BY:

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13. ABSTRACT (Maximum 200 words) The Mk 635 Mod 0 Shipping and Storage Container was tested for conformance to Performance Oriented Packaging criteria established by the United Nations Recommendations on the Transport of Dangerous Goods. The box was tested with a gross weight of 70.5 pounds (32 kilograms).				
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INTRODUCTION

The MK635 Mod 0 Shipping and Storage Container was tested to ascertain whether the container would meet the requirements of Performance Oriented Packaging (POP) as specified by the United Nations Recommendations on the Transport of Dangerous Goods Document, ST/SG/AC.10/1, Revision 6, Chapters 4 and 9. A base level vibration test was also conducted in accordance with the rulings specified by the Department of Transportation Performance Oriented Packaging Standards, 49 CFR Part 106 et al. Federal Register/Vol. 56, No. 245/Friday, December 20, 1991/Rules and Regulations. The objectives were to evaluate the adequacy of the container in protecting and retaining the contents when secured with appropriate dunnage.

The MK635 Mod 0 Shipping and Storage Container is a steel drum with a removeable lid. The container is shown in Figure 1. Each container lid was secured with a V-retainer and a lead seal during the testing.

TESTS PERFORMED

1. Drop Test

This test was performed in accordance with ST/SG/AC.10/1, Chapter 9, Paragraph 9.7.3. Six containers were used during the test series, one for each drop. Three drops were conducted at each orientation listed below from a height of 1.8 meters:

- a. 45° from vertical on V-retainer closure
- b. Horizontal on container seam (closure of V-retainer positioned 180° from seam)

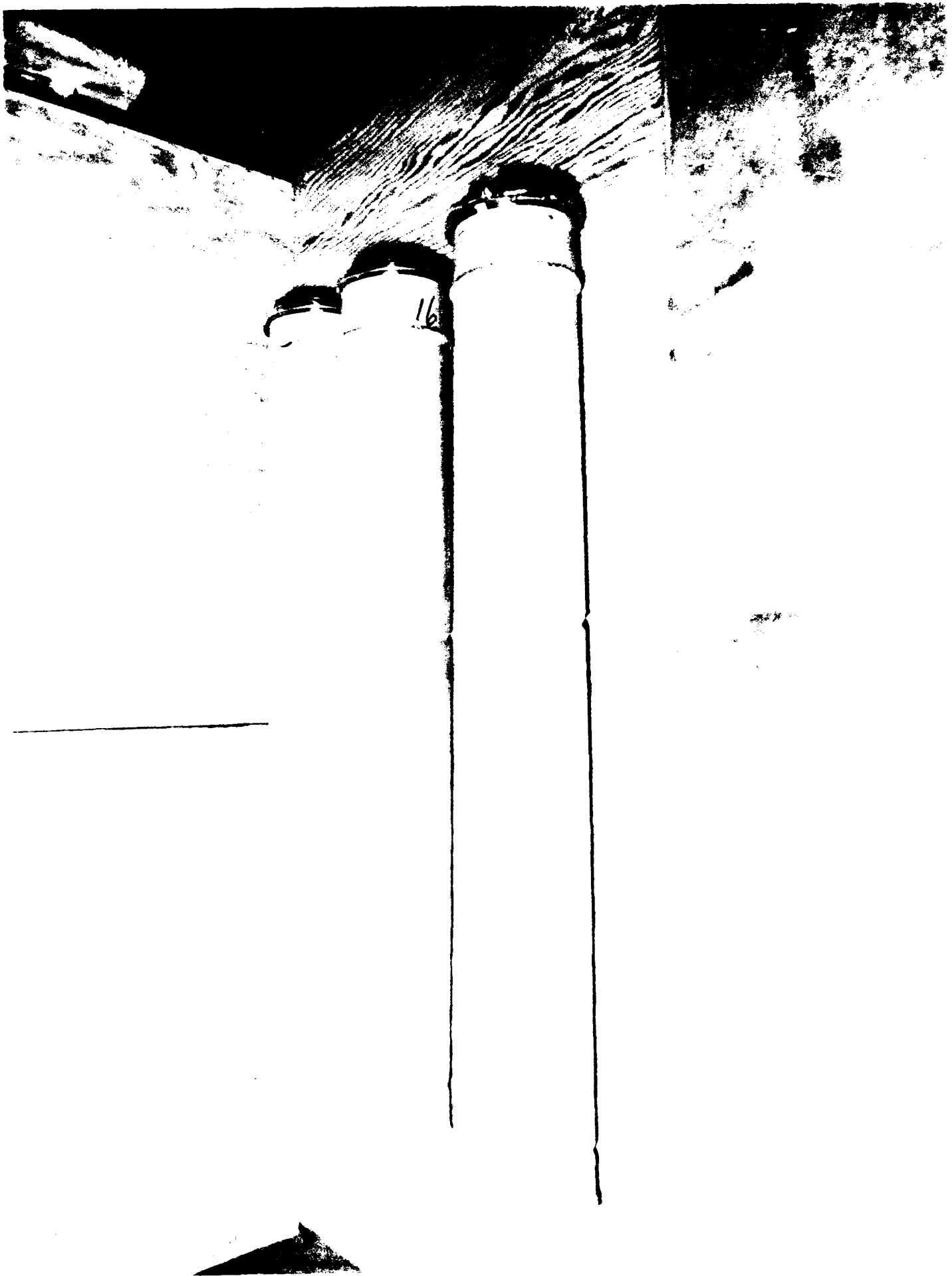
The tests were performed at ambient temperature (70° + 20°F). The contents of the container should be retained within its packaging and exhibit no damage liable to affect safety during transport.

2. Stacking Test

This test was performed in accordance with ST/SG/AC.10/1, Chapter 9, Paragraph 9.7.6. Three different containers were used, each with a stack weight of 1000 pounds. This weight represents the load superimposed on the bottom container of a ten-foot stack of MK635 containers weighing 70.5 pounds each. The test was performed for 24 hours. After the allowed time, the weight was removed and the container examined. Any leakage, deterioration, or distortion which could adversely affect transport or reduce its strength or cause instability in stacks of packages is cause for rejection.

3. Base Level Vibration Test

One sample container was loaded with live Flexible Linear Shaped Charges and closed as for shipment. The container was



subjected to standard transportation vibration testing for a period of six hours. The test was performed for two hours in each of three principal axes.

PASS/FAIL (UN CRITERIA)

The criteria for passing the drop test is outlined in Paragraph 9.7.3.5 of ST/SG/AC.10/1 and states the following: "Where a packaging for solids undergoes a drop test and its upper face strikes the target, the test sample passes the test if the entire contents are retained by an inner packaging or inner receptacle (e.g., a plastic bag), even if the closure is no longer sift-proof".

The criteria for passing the stacking test is outlined in Paragraph 9.7.6.3 of ST/SG/AC.10/1 and states the following: "No test sample should show any deterioration which could adversely affect transport safety or any distortion liable to reduce its strength or cause instability in stacks of packages".

PASS/FAIL (FEDERAL REGISTER CRITERIA)

The criteria for passing the Base Level Vibration Test is outlined in the Federal Register/Vol. 56, No. 245/Friday, December 20, 1991/Rules and Regulations and states the following: "Immediately following the period of vibration, each package shall be removed from the platform, turned on its side and observed for any evidence of leakage. A packaging passes the vibration test if there is no rupture or leakage from any of the packages. No test sample should show any deterioration which could adversely affect transportation safety or any distortion liable to reduce packaging strength."

TEST RESULTS

1. Drop Test

Satisfactory.

2. Stacking Test

Satisfactory.

3. Base Level Vibration Test

Satisfactory.

DISCUSSION

1. Drop Test

After each drop the container was inspected for any damage which would be cause for rejection. The containers were slightly damaged during the tests, but all V-retainers and lead seals remained fastened securely.

2. Stacking Test

Three containers were individual , tested. Each container was visibly inspected after the 24-hour period was over. There was no leakage, distortion, or deterioration to the container as a result of this test.

3. Base Level Vibration Test

Immediately following the vibration test, each container was removed from the platform, turned on its side and observed for any evidence of leakage. There was no evidence of leakage of contents.

REFERENCE MATERIAL

United Nation's "Recommendations on the Transport of Dangerous Goods", ST/SG/AC.10/1, Revision 6

Department of Transportation Performance Oriented Packaging Standards, 49 CFR Part 106 et al. Federal Register/Vol. 56, No. 245/Friday, December 20, 1991/Rules and Regulations

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DATA SHEET

CONTAINER:

MK635 Shipping and
Storage Container

POP MARKING:

1A2/Y32/S/**
USA/DOD/NAD

Type: 1A2

UN Code: See Table I

Specification Number:
53711-5206281

Material:
Steel

Gross Weight:
32.0 kg
(70.5 pounds)

Dimensions:
1.31 m L x .20 m DIA
(51.56" L x 8.0" DIA)

Closure (Method/type):
Screw-on cap

Tare Weight:
4.6 kg
(10.1 pounds)

Additional Description: Lid secured with V-retainer and
lead seal (MS51938-5) during tests.

PRODUCTS:

See Table I

Proper Shipping Name: See Table II

United Nations Number: See Table I

United Nations Packing Group: II

Physical State: Solid

Amount Per Container: See Table I

Net Weight: Varies

TEST PRODUCT:

Name: Sand

Physical State: Solid

Size: N/A

Quantity: N/A

Dunnage: None

Gross Weight: 32.0 kg (70.5 lbs.)

TABLE I

NALC/ DODIC	NSN	ITEM	PACKING DRAWING	HAZ. CL.	UN NO.	# PER CNTR.	GROSS WT.
3W80	1320-01-247-0627	MK216-0 RF CTG.	6348315	1.3C	0186	1	65.0
3W80	1320-01-352-3678	MK216-1 RF CTG.	6813901			1	65.0
4W35	1320-01-258-0290	MK186-0/E 5.125 CTG.	5186484	1.3J	0247	1	60.0
4W61	1320-01-263-2854	MK229-0 PRAC. CTG.	5177715	1.4S	0173	1	
4W61	1320-01-301-5651	MK229-0 PRAC. CTG.	6375535	1.4S	0173	1	62.0
5W59	1320-01-264-5441	MK186-2 5.125 CTG.	5388289			1	
7W69	1320-01-158-4113	MK182-2 5.125 CTG.	3193399	1.4S	0173	1	60.0
9W22	1320-01-185-8157	MK214-0 RF CTG.	6133075	1.4S	0173	1	62.0
9W22	1320-01-328-5098	MK214-1 RF CTG.	6775105			1	62.0
EW75	1320-01-074-7046	MK186-0 5.125 CRG.	5186484	1.3G	0010	1	60.0
EW75	1320-01-217-8724	MK186-1 5.125 CTG.	5388257	1.3G	0054	1	60.0
EW76	1320-01-045-7859	MK182-1 5.125 CTG.	3193399	1.4S	0173	1	60.0
EW77	1320-01-045-7860	MK193-0 5.125 CTG.	*3193399	1.4S	0173	1	60.0
EW77	1320-01-095-9772	MK193-1 5.125 CTG.	5177715	1.4S	0173	1	62.0
ML09	1375-01-079-3899	20 GR/FT FLEX CHG.	5206261	1.1D	0288	18	19.7
ML10	1375-01-079-3900	30 GR/FT FLEX CHG.	5206262	1.1D	0288	18	21.3
ML11	1375-01-079-3901	40 GR/FT FLEX CHG.	5206263	1.1D	0288	18	22.8
ML12	1375-01-079-3902	60 GR/FT FLEX CHG.	5206264	1.1D	0288	18	26.0
ML13	1375-01-079-3903	75 GR/FT FLEX CHG.	5206265	1.1D	0288	18	28.4
ML14	1375-01-079-3904	125 GR/FT FLEX CHG.	5206266	1.1D	0288	15	33.0
ML15	1375-01-079-3905	225 GR/FT FLEX CHG.	5206267	1.1D	0288	15	46.3
ML16	1375-01-079-3906	300 GR/FT FLEX CHG.	5206268	1.1D	0288	15	54.2
ML17	1375-01-079-3907	400 GR/FT FLEX CHG.	5206269	1.1D	0288	9	48.2
ML18	1375-01-079-3908	500 GR/FT FLEX CHG.	5206270	1.1D	0288	9	56.2
ML19	1375-01-079-3909	600 GR/FT FLEX CHG.	5206271	1.1D	0288	9	64.1

* ALTERNATE PACKING DRAWING 53711-5177715

TABLE II

UN NO.	PROPER SHIPPING NAME
0010	AMMUNITION, INCENDIARY
0054	CARTRIDGES, SIGNAL
0173	RELEASE DEVICES, EXPLOSIVE
0186	ROCKET MOTORS
0247	AMMUNITION, INCENDIARY
0288	CHARGES, SHAPED, FLEXIBLE, LINEAR